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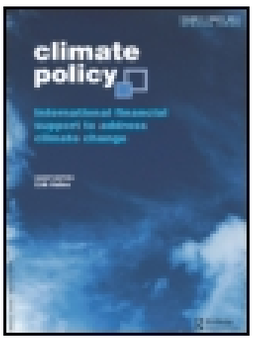

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# Towards a fossil fuel non-proliferation treaty

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**ABSTRACT**

A new approach is needed to tackle the climate crisis, in which the long overlooked supply-side of fossil fuels takes centre stage. A crucial aspect of this is the need for international agreements and law to effectively and fairly leave large swathes of remaining fossil fuels in the ground. Towards that end, we make the case for a Fossil Fuel Non-Proliferation Treaty (FF-NPT) to deal with emissions at source. Having explained the need for such a treaty, we propose overall aims, and both a process and principles for the sequencing of efforts across fuel types and regions based on equity and justice. We discuss the form an FF-NPT could take, as well as some of the key challenges it would have to overcome. We suggest strategies for overcoming key challenges in relation to reserves in developing countries, questions of the just transition, and incentives for countries to sign up to such a treaty.

**Key policy insights**

- The supply-side of fossil fuels should occupy a central place in collective efforts to address climate change.
- A proposed new Fossil Fuel Non-Proliferation Treaty (FF-NPT) could help to keep large swathes of fossil fuels in the ground, effectively and fairly.
- A process towards this end could start with an assessment of existing reserves, as well as agreement on the principles for the sequencing of production phase-down targets across countries and fuel types, with the aim of aligning fossil fuel use with the Paris Agreement's 1.5°C warming threshold.
- Strategies to advance the proposed FF-NPT will have to recognize current and historical exploitation of fossil fuel reserves, provide alternative ways of meeting the development needs of the poorest countries without fossil fuels, and include credible systems of monitoring and compliance to induce trust and cooperation.

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## Introduction

A new, complementary approach is needed to tackle the climate crisis. A line in the sand is needed to underpin the existing Paris Agreement and exert influence over the immediate choices of policymakers. The latest UN Environment Programme (UNEP) report on *The Emissions Gap* states:

> Pathways reflecting current NDCs [nationally-determined contributions] imply global warming of about 3°C by 2100, with warming continuing afterwards. If the emissions gap is not closed by 2030, it is very plausible that the goal of a well-below 2°C temperature increase is also out of reach. (UNEP, 2018, p. 4)

The latest findings of the Intergovernmental Panel on Climate Change (IPCC) Special report on Global Warming of 1.5 degrees (SR15) call for carbon emissions to be cut overall by 45% by 2030 and for investments in fossil fuel extraction and unabated (without carbon capture and storage (CCS)) power generation to fall by up to US$0.85 trillion over 2016–2050, with unabated coal falling to zero by 2030 (IPCC, 2018). At the time of writing, however, global demand for coal, oil and gas are all growing (IEA, 2018), with fossil fuels accounting for 81% of energy use.

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The International Energy Agency projects that total fossil fuel use will rise for decades to come (WEO, 2018). Yet Carbon Tracker (2013) suggests that even to keep warming below 2°C, 80% of coal, oil and gas reserves are now unburnable. Doubts concerning the potential contribution of as-yet embryonic negative emissions technologies (Keary, 2016), and the limited development of CCS, that are built into models mean the proportion of unburnable reserves may be even higher (Anderson & Peters, 2016).

Pressure in the wake of the Paris Agreement and statements from the Group of 7 that fossil fuel emissions should not be allowed in any sector of the economy by the end of the century (Connolly, 2015) send clear signals about the overall direction of change. When combined with principles of equity and burden-sharing, we argue these aims imply a moratorium in rich countries on any further expansion of the fossil fuel industry, or any infrastructure heavily dependent on it. We argue that international agreements and law to ensure that large swathes of remaining fossil fuels are effectively and fairly left in the ground are urgently needed to implement such a moratorium. Towards that end, we make the case for a Fossil Fuel Non-Proliferation Treaty (FF-NPT).

Though calls for a coal convention have been made before by academics (Burke, Fishel, Mitchell, Dalby, & Levine, 2016; Christoff & Eckersley, 2013) and leaders such as former President Tong of Kiribati, while dialogues such as the 2015 Suva Declaration on Climate Change have called for a moratorium on the construction of new coal mines, we argue that a more general FF-NPT is needed, since the majority of remaining oil and gas reserves must also remain in the ground. According to the IPCC SR15, limiting warming to 1.5°C requires 'transformative systemic change', involving the upscaling and acceleration of far-reaching climate mitigation across all regions and sectors (IPCC, 2018). This will not happen while access to fossil fuel reserves remains unconstrained.

In this paper, we firstly discuss the context for a new global supply-side FF-NPT by documenting the recent rise in supply-side restrictions being adopted by governments at the national level, demonstrating political appetite for a fresh approach. Secondly, we sketch the broad contours of the proposed FF-NPT. Thirdly, we address the issue of how to build political support for such an FF-NPT.

## Climate for change? The rise of supply side actions

Despite the neglect of supply-side solutions through international law (Piggot, Erickson, van Asselt, & Lazarus, 2018), at the national level, there have been recent bold moves by governments to leave fossil fuels in the ground (Erickson, Lazarus, & Piggot, 2018) which suggest scope for collective coordination and international oversight of further such efforts. Examples include recent moratoria on new oil exploration and production announced in 2017 and 2018 by a number of countries including New Zealand, France and Belize, as well as Costa Rica, which has a moratorium on oil exploration in place that has been extended to 2021. There are also moratoria in place on hydraulic fracturing ('fracking') in a number of jurisdictions globally such as France, Germany, Ireland, Wales, Scotland and Uruguay, and hundreds of subnational jurisdictions. Other countries, such as the UK, Spain and China, have set near-term timetables for the phasing out of existing fossil fuels (especially coal). Indeed, the 'Powering Past Coal Alliance', launched in November 2017, includes more than 25 nations that have pledged to phase out coal-fired power generation. Membership of the Alliance requires states to make (non-binding) public declarations that they will refrain from building new, unabated coal-fired power stations and will phase out existing ones (PPCA, 2018). Norway's sovereign wealth fund has also divested from coal stocks, while Ireland's Parliament has voted to require its sovereign wealth fund to divest from all fossil fuel stocks.

Internationally, there are precedents for bans on fossil fuels such as the moratorium in place for mining projects in Antarctica (Article 7 of the Environmental Protocol of the Antarctic Treaty). The International Council on Mining and Metals has committed its members (including the World Coal Association) to neither explore nor mine in World Heritage Sites and to 'respect legally designated protected areas' (ICMM, 2003). Likewise, there are calls for banning oil drilling in the Arctic Sea and to halt exploitation in protected areas and on indigenous lands (LINGO, 2018). The 2017 Lofoten Declaration meanwhile, signed by over 500 organizations, highlights the need to put an end to fossil fuel development and manage the decline of existing production.

Such supply-side policies are underpinned by the emergence of what Green (2018) describes as 'anti-fossil fuel norms' (AFFN), which are created and reinforced by sustained pressure from fossil fuel divestment and broader climate movements, as well as concern on the part of financial actors about potentially 'stranded' assets in their portfolios (Grantham Institute, 2013). Such norms impact upon state behaviour through

mechanisms of 'international socialization' and 'domestic political mobilization'. They are often driven and diffused by organized movements such as that around divestment (Bergman, 2018) and led by norm entrepreneurs such as Bill McKibben, co-founder of 350.org, or Pope Francis, for example, who endorsed the phasing out of fossil fuels in his encyclical, 'Laudato Si' (Kirchgaessner, 2015). In this sense, as Green (2018, p. 113) argues, 'structural conditions are more conducive than at any previous time to the spread of AFFNs' including the rise of supply-side actions described above.

## The proposal for a fossil fuel non-proliferation Treaty

### *Analogies and precedents: the nuclear non-proliferation Treaty and beyond*

The idea of non-proliferation first emerged in the context of efforts to counter the threat of nuclear war through the creation of a nuclear non-proliferation treaty. Interestingly, parallels are increasingly drawn between the scale of the threat posed by nuclear weapons and that of runaway climate change by actors as diverse as the US Central Intelligence Agency (CIA) (Embury-Dennis, 2017), the Bulletin of the Atomic Scientists (Bulletin of the Atomic Scientists, 2019) and the World Economic Forum, which names 'weapons of mass destruction' and 'failure of climate mitigation and adaptation' as the top two threats facing the world (WEF, 2019). The parallel was, in fact, perhaps most clearly articulated more than three decades ago in the statement from the Toronto Conference on a Changing Atmosphere in 1988 that 'Humanity is conducting an unintended, uncontrolled, globally pervasive experiment whose ultimate consequences could be second only to a nuclear war'.

The nuclear non-proliferation treaty (NPT), agreed just over 50 years ago between 1965 and 1968, was a triumph of rapid diplomacy, at the height of cold war mistrust, and against an immense security threat. Former US arms negotiator Robert Grey said the NPT 'is in many ways an agreement as important as the UN charter itself' (quoted in Bunn, 2003, p. 4). As Kuppuswamy suggests (2006, p. 142) 'It has been hailed as one of the great success stories of arms control and an indispensable tool in preventing the spread of nuclear weapons'. It is noteworthy that the NPT is the only international convention that addresses non-proliferation issues comprehensively and has been signed by 191 states. It has also obtained a near universal membership, and the obligations of the state parties to the treaty acquired permanence after the indefinite extension in 1995 of the treaty, which includes five yearly reviews to monitor progress and ratchet up commitments. More countries have adhered to the NPT than to any other arms limitation and disarmament agreement (UNODA, 2019). The conclusion of the Treaty within such a short time frame was an impressive achievement given the levels of distrust and the entrenched and rivalrous power politics prevalent at the time. Negotiations began in a context of 'stalled nuclear disarmament negotiations' and 'acute tensions over the nuclear aspects of European security' (Simpson & Elbahtimy, 2018, p. 14). The speed with which the Treaty is currently being re-negotiated as part of the 2020 review cycle is also notable, accelerated by the remarkable conclusion of the Treaty on the Prohibition of Nuclear Weapons (or Nuclear Weapons Ban Treaty) in 2017.

Our purpose here is to invoke the nuclear NPT as a useful analogy for efforts to multilateralise supply-side policy on climate change. In doing so, it is worth noting ongoing concerns about the nuclear regime's effectiveness, especially around enforcement given the slow pace of disarmament and the ease of withdrawal from the Treaty, an issue that threatens all multilateral processes. In the case of the NPT, it is in the interest of the world's most powerful countries – who already possess nuclear weapons – to ensure that others do not acquire similar capabilities. In the case of climate change, however, the majority of countries in the world already have at least some reserves of fossil fuels, even though these are unevenly distributed. The challenge is then how to negotiate their non-use in a fair and credible way at the speed and scale required to avoid a collective threat to all states and their citizens. In this sense multilateral responses may be attractive to powerful countries wanting to ensure other states do not free-ride on commitments they are now making to leave fossil fuels in the ground. They would, in fact, be doing so in response to a threat which, through the climate negotiations and G7 statements, they have already committed themselves to addressing. Powerful countries are also not immune to the anti-fossil fuel norms described above and indeed many of the groups that have articulated such norms most clearly are based in countries such as the US and EU. What is useful and analogous for the purposes of our discussion here, however, is less the question of the effectiveness of the NPT and more the precedent it provides

in terms of both the speed with which the agreement was concluded and its structure. Hence our purpose in invoking the NPT is to (i) establish the principle of non-proliferation as key to a new supply-side agreement (ii) to draw parallels with the principles and structure that might underpin the proposed FF-NPT and (iii) to show how rapidly such an agreement can be concluded even in the face of a challenging political environment.

There are also other precedents whose lessons could be further explored for the light they might shed on the politics of designing an FF-NPT. These include treaties on landmines and chemical weapons, or the World Health Organization Framework Convention on Tobacco Control, whose definition of the scope of 'tobacco control' includes supply strategies, as well as demand and harm reduction. Restrictive supply-side policies have also played an important role in efforts to address other environmental challenges, including ozone-depleting substances (Benedick, 1991), asbestos (Waldman, 2011), and lead in petroleum products.

### *Three pillars: non-proliferation, disarmament and peaceful use*

The NPT has a three-pillar structure that its fossil fuel equivalent could emulate. The first is 'non-proliferation' itself, which in the climate change case would refer to preventing the exploitation of new fossil fuel resources: at minimum, do no further harm. As the Lofoten Declaration states, 'We are in a deep hole with climate. We must begin by not digging ourselves any deeper' (Lofoten declaration, 2018).

An overall guiding principle would have to be the percentages of each fossil fuel that need to remain in the ground, based on models such as those produced by McGlade and Ekins (2015) and continually revised in line with knowledge about what is required to keep warming below 1.5°C. This would be akin to the NPT process where five yearly reviews are undertaken, and aligns well with the stock-taking exercises proposed as part of the Paris Agreement. The FF-NPT would be a mechanism for coordinating and verifying these obligations. Addressing non-proliferation in the nuclear case required a stock take of who had what weapons. There could be a similar global mapping and assessment of those fossil fuel reserves which, if burned, would carry us across the 1.5°C warming line. The assessment could be undertaken by the International Energy Agency (IEA) or a UN body, just as the International Atomic Energy Agency (IAEA) performs that function for the NPT. This assessment would require reporting from national energy ministries on existing reserves. It is possible to produce such an assessment. According to Carbon Tracker's Mark Campanale, '[t]he fossil fuel industry knows with some certainty future production often decades in advance … . What we need is a global, public register setting out who controls the reserves from where the $CO_2$ is coming' (quoted in Simms & Newell, 2018). SEI (2018) also show how the adoption of a simple 'extraction-based accounting system' – in parallel with existing territorial greenhouse gas (GHG) emissions accounting – could help track countries' production levels and associated emissions. International agencies such as UNEP could also regularly release an analysis (akin to the existing Emissions Gap Report) that would identify whether countries' aggregate production phase-down targets and policies (see below) align with the 1.5-2°C warming limit. This could be combined with the creation of national committees, independent of government, which would track and report on carbon budgets, for which governments are held to account.

Reporting and monitoring of supply-side measures to ensure non-proliferation should be easier than for many other climate policy tools currently in use. First, it would target a relatively small number of large, easily identifiable projects operated by administratively competent firms upstream in the fossil fuel supply chain. Fossil fuel infrastructures are easily observable by satellite and so can straightforwardly be monitored by governments, international institutions and civil society organizations alike. Second, the commodities to be accounted for are not only much easier to monitor and measure than GHG emissions (especially coal and oil), but they are typically already measured by firms for existing administrative purposes such as resource tax liability assessment and compliance with local environmental license conditions (Green & Dennis, 2018). Mutually verified compliance would help to build trust, encouraging states to escalate their commitments over time as repeated cycles of reciprocal action-and verification build their confidence in the integrity of an FF-NPT (Ruzicka & Wheeler, 2010). There are precedents here from the Chemical Weapons Convention, whose system includes routine inspections, as well as a 'challenge inspection', which can be triggered by states if they suspect another state is noncompliant. Accused states that deny inspectors access face sanctions and other collective measures in conformity with international law (Thakur & Haru, 2006). Moreover, as Green

and Dennis (2018, p. 84) note, since the Paris Agreement's success is predicated on states' gradual escalation of their commitments over time, commitments to implement supply-side policies offer major advantages as 'a currency of international climate cooperation', demonstrating the seriousness of their ambition by leaving certain reserves of fossil fuels in the ground. Hence, such policies could be counted as key measures in countries' NDCs, as well as logged in the inventory we propose below to build momentum while the details of the FF-NPT are agreed so as not to delay progress.

The second pillar of the NPT is 'disarmament' since non-proliferation is not sustainable without disarmament. A secondary goal of the FF-NPT would then be to coordinate the managed and accelerated decline of existing fossil fuel infrastructures. But disarmament would also be delivered not just by restricting supply, but also reducing demand. This could be achieved through better planning around energy, housing, transport and food and the construction of climate smart cities for example, all of which can and should be covered under the NDCs to which all parties to the Paris Agreement are already committed.

The final pillar concerns the promotion of the 'peaceful' use of technology. The 'basic bargain' in the NPT was that, in return for foregoing the acquisition of nuclear weapons, the non-nuclear weapons states secured from the nuclear states a commitment to provide them with nuclear technology suitable for the development of civil nuclear energy industries and to restrain the vertical spiral in nuclear weapon inventories (Smith, 1987). In a climate context, that would mean massively expanding existing initiatives to provide poorer countries with access to low carbon and non-fossil-fuel clean energy and transport, and the technology needed for its development. Funds could be redirected from fossil fuel subsidies which make up the equivalent of 6.5% of global GDP, as well as generated through a global carbon tax and potentially held in the Global Transition Fund that we propose below (Coady, Parry, Sears, & Shang, 2015). The IMF found, for example, that eliminating post-tax subsidies could raise government revenue by $2.9 trillion (3.6% of global GDP), cut global $CO_2$ emissions by more than 20%, and cut premature air pollution deaths by more than half (Coady et al., 2015).

### *Burden-sharing principles*

Based on the global map and assessment of the distribution of fossil fuels proposed above, it will become clear which level of contribution a country is being expected to make by leaving reserves in the ground. Given different endowments of fossil fuels among countries, a calculation of their financial value would have to be made, so it is clear what degree of sacrifice each country is making for the common good and equitable degrees of burden-sharing can be allocated. Negotiations towards an NPT would necessarily and undoubtedly link across different fossil fuels based on the financial value of the respective reserves; some countries would leave more coal, oil or gas in the ground depending on the location of reserves and their value, and in light of which targets other countries are committing to.

Burden-sharing would be reflected principally through differentiated targets and timetables for first halting, and then phasing out, fossil fuel production by countries. Criteria for allocating and sequencing responsibility would include that (i) the costs of action should be borne disproportionately by those who have the greatest ability to pay defined by per capita income levels and that are best placed to redirect finance, production and technology towards lower carbon alternatives (ii) the greatest emitters of GHG emissions from the direct burning of their own fossil fuel reserves should act first (iii) cumulative emissions are assessed to take adequate account of historical responsibility and use of fossil fuels to date (Collier & Venables, 2014). These are principles which in different ways are already embedded in the climate regime around notions such as 'common but differentiated responsibilities and respective capabilities'.

These three criteria broadly imply OECD countries, plus the Russian Federation (OECD+), taking the lead in the first instance with near-term targets and timetables for the phase out of fossil fuels. In the words of the Lofoten Declaration, 'leadership must come from countries that are high-income, have benefitted from fossil fuel extraction, and that are historically responsible for significant emissions'. Many of the world's largest and most powerful private fossil fuel companies have their home base in OECD+ countries, such that to avoid problems of carbon leakage and to improve ease of compliance, fossil fuel assets held overseas by a country's home companies would be subject to supply-side commitments under an FF-NPT. This is similar to other international legal and quasi-legal approaches to the conduct of transnational corporations overseas, which expect

compliance with home country regulations when operating abroad (Newell, 2001). This is critical because just six of the largest listed oil and gas companies alone hold reserves that together would use up more than a quarter of the remaining 2°C budget (McKibben, 2012). And historically speaking, just 90 companies have caused two-thirds of anthropogenic global warming emissions including OECD based companies such as Chevron, Exxon, Shell and BP and half of the estimated emissions were produced in the past 25 years – well past the date when governments and corporations became aware that rising GHG emissions from the burning of coal and oil were causing dangerous climate change (Heede, 2014).

A second tier of next mover countries would be large non-OECD emitters such as China, India, Brazil and Indonesia, all of whom feature in the top ten global GHG emitters which together account for nearly three-quarters of global emissions (WRI, 2017). Given the size of their economies and populations, decisions they make about energy pathways and infrastructures will have a critical bearing on the success of the FF-NPT. Several are leaders in the development and adoption of renewable energy and most now enjoy levels of growth and access to public and private finance that will allow them to finance alternatives to fossil fuels and forego substantial reserves of fossil fuels. These countries would expect, nevertheless, to take on longer phase down targets and timetables than OECD+ countries because of their reduced historical responsibility for climate change.

Over time though, to be effective, the FF-NPT Treaty would need to go beyond current large emitters with the greatest capacity to transition away from fossil fuels and that bear most historical responsibility for climate change, and include most UN members to ensure that poorer countries are not locked-in to high carbon pathways. It would need to help finance, including through the redirection of fossil fuel subsidies as well as multilateral development bank and donor support, lower carbon infrastructures and technologies to meet the energy and other developmental needs of the world's poor. This it could do through the proposed Global Transition Fund described below.

The economics of restrictions to supply raise the prospect of the 'green paradox' whereby (Sinn, 2012) countries might race to extract resources that might become 'stranded' (that is, unusable), driving up fossil fuel production in the short-term. Yet credible attempts to restrict supply will induce expectations of high fossil fuel prices and stimulate investment in low carbon technologies and infrastructures as well as reducing consumption of fossil fuels worldwide with multiple climate and other benefits. This is a key argument for ensuring the global coverage of an FF-NPT over time. Another concern relates to the specter of rising electricity costs. Indeed, the cost of electricity generated from fossil fuels would increase, to reflect its true social and environmental costs. But low carbon forms of electricity would become more affordable and available as is happening at present with the falling costs of solar in particular. It is clearly also the case that the FF-NPT would not exist in isolation from other policy measures such as carbon taxes and efforts to support renewable energy provision.

Beyond suggesting first principles, it is difficult to anticipate, let alone directly proscribe, the nature of issue-linkage that states would want to engage in in order to arrive at an FF-NPT that is both effective in climate terms and perceived as equitable. The hope would be that once a critical mass of states takes further action along these lines, further momentum and norm building will occur as the pressure to take action mounts and incentives to free-ride diminish. The desire to minimize carbon leakage and prevent other states from free-riding would incentivise first-mover governments to encourage others to adopt supply-side policy interventions. Likewise, the precise nature of the national targets and timetables to achieve non-proliferation and then to phase out fossil fuel production is difficult to foresee, but would be need to be negotiated according to the burden sharing criteria outlined above.

### *Sequencing of actions*

We have argued that all fossil fuels would need to be on the table in negotiations towards an FF-NPT as there would need to be bargaining across oil, coal and gas, given their uneven distribution across countries. A first principle, however, might be to prioritize the most carbon intensive fuels. Given the carbon intensity of coal, its diminishing financial viability and its substitutability in most cases, it might be an appropriate focus for the first wave of negotiations. For example, Collier and Venables (2014, p. 492) suggest:

> Coal is singled out because of its high emissions intensity, low rents per unit value, local environmental costs, and sheer scale. Direct supply policy—the sequenced closure of coal mines—may lead to less policy leakage (across countries and time) than other policies based on demand or price management. It also has the advantage of involving relatively few players and leading to clear-cut and observable outcomes. Appropriately sequenced closure of the world coal industry could, we suggest, create the moral force needed to mobilize collective international action.

At present, 43% of $CO_2$ emissions come from fuel combustion and nearly 25% of total $CO_2$ equivalent emissions come from coal (Collier & Venables, 2014). Further, both the level and share of coal in emissions has been increasing. Coal has markedly higher emissions of $CO_2$ and other pollutants per unit of energy than other fossil fuels and the prospect of the widespread use of widely vaunted CCS technologies remains remote. Hence any successful strategy for combating climate change will have the phasing out of coal as a major consequence (Collier & Venables, 2014).

Given that there are only a few countries whose coal industry is currently material, a truly global sequence is unnecessary, potentially simplifying the process of agreement (Collier & Venables, 2014, p. 506). These countries are China, USA, India, Australia, Russia, Germany, Poland, Indonesia, and South Africa. Though they differ hugely on all three criteria identified above – income, current emissions, and past cumulative emissions – in weighting these, a fairly clear sequence of action would emerge. The US, Australia and Germany can readily be identified as the first movers. The next group is probably Russia and Poland, both upper-middle-income countries with a long history of high carbon emissions. After them come China and South Africa, followed by Indonesia and India. Agreement to lead in closure would be conditional on those expected to act later not increasing their production in the meantime, hence undermining the temptation to extract assets likely to become stranded under the treaty (Sinn, 2012). These would clearly not be the only countries involved, and the criteria could be extended to others sharing similar characteristics in order to widen and deepen involvement and reduce the effect of free-riding by non-participants in the FF-NPT.

Over time, beyond restricting access to new fossil fuel frontiers, as noted above, an FF-NPT would also have to pursue the second goal: addressing the managed and accelerated decline of existing investments and infrastructures. This brings with it the need to ensure that the transition away from fossil fuels is a just one (Caldecott, Sartor, & Spencer, 2017; Johnstone & Hielscher, 2017; Spencer et al., 2018). Though it would be beyond the remit of the FF-NPT to proscribe national level measures, experience to date suggests the impacts of fossil fuel decline on workers and communities can be dampened by using a mix of safety nets, vouchers and cash transfers. This implies developing and negotiating explicit social contracts for sustainability transitions with losers as well as winners, including compensation and severance packages (as has occurred in Poland), (re-)training assistance (which is currently a contested terrain in China in the face of closures of coal plants, see Caldecott et al. (2017)), or regional economic development programmes (as has been done in Germany). This also underscores the argument for starting with coal when considering the accelerated decline of existing fossil fuel infrastructures since the production of coal is highly concentrated.

### *Financing and Governance*

To address issues of equity in sequencing, subsidies at the national level currently going towards financing new fossil fuel exploration as well as supporting existing fossil fuel infrastructures would be redirected towards meeting energy needs in lower carbon ways. A Global Transition Fund under the FF-NPT could administer and oversee the reallocation of fossil fuel subsidies, and potentially revenues from a global carbon tax, towards countries needing additional finance to meet energy and other needs in lower carbon ways. Such global redistribution mechanisms are always controversial and encounter significant political resistance. But some means would have to be found for the global recycling of financial support to the fossil fuel industry towards the development of non-fossil fuel infrastructures where they are most needed. A Global Transition Fund would be distinct from bodies such as the World Bank Climate Investment Funds, but could feasibly operate under the umbrella of the UN Green Climate Fund rather than attempt to create a new body from scratch.

The emphasis of the FF-NPT's Global Transition Fund would be on financing energy needs through low carbon means and not compensating countries for projected lost revenues from leaving fossil fuels in the

ground. Claims regarding compensation for foregone revenues need to be treated with caution. Harstad (2012) shows that the cost of compensating producers for output forgone is less than the benefit received including the cost of damage from emissions. Yet the experience of the Yasuni initiative in Ecuador (where the government requested compensation for a share of lost oil revenues if reserves under the Yasuni national park were to be left in the ground) should strike a note of caution about the the difficulty of mobilizing funds for compensation from the international community and the reluctance to set precedents for other countries to use their fossil fuel reserves as a basis for demanding payment (Lenferna, 2018; Sovacool & Scarpaci, 2016). There is clearly a fine line between compensation and what other countries perceive to be extortion. Assessments of the value of reserves of fossil fuels clearly need to be conducted internationally, independently and verifiably as a basis for assessing comparative commitments and targets, as described above, but not as entitlements to compensation.

This leads to the question of which institution would host the negotiation of an FF-NPT. A UN agency or a coordinating body such as UN-Energy might be among the candidates. The appeal of the UN would be that, although richer countries would be expected to lead first, the treaty would in the end be global and multilateral. The IEA is often seen as too much of an 'energy consumers club', the mirror opposite of the 'producer's club' the Organization of Petroleum Exporting Countries (OPEC). Having a UN agency such as the IAEA involved in managing the nuclear NPT was critical to its universal legitimacy, and the same will be true for climate change.

## Building support for an FF-NPT

What would a political strategy for building support for such an FF-NPT look like? Clearly such a bold proposal, which would represent a direct threat to some of the most powerful and well-resourced interests in the world, will face a very high level of opposition. Though this is to be expected and is inevitable from those actors whose profitability resides in extracting remaining fossil fuels, an FF-NPT would have a number of advocates beyond climate activist groups. The above-mentioned Lofoten Declaration, signed by 500 organizations from 76 countries, representing business, civil society, universities, research organizations, foundations, cities and churches, suggests the potential for a broad base of public support, affirming 'that it is the urgent responsibility and moral obligation of wealthy fossil fuel producers to lead in putting an end to fossil fuel development and to manage the decline of existing production'.

The key to setting the negotiations in train will be leadership by a sub-set of states. Those that have already taken bold stances on supply-side policy, described above, would be strong candidates. As Green and Dennis suggest, (2018, p. 83) 'the emergence of international cooperation on fossil fuels is likely to be contingent on a coalition of early-movers taking unilateral steps to limit or reduce fossil fuel supply'. To capture progress and generate positive incentives for wider participation, we are suggesting the creation of a LINGO (Leave it In the Ground) inventory, named after the existing coalition by that name (LINGO, 2018). Rather like the Global Climate Action portal under the climate change regime[1], during a preliminary phase, and while negotiations proceed on the overall content and architecture of the FF-NPT, countries could submit actions they have undertaken, or are planning, to a LINGO inventory. This would provide a transparent and comparable register of countries' actions that would feed into the negotiations and form the basis for the assessment of existing reserves and their value, as proposed above. These would also be reflected in country NDCs in the context of the Paris Agreement, calculating emissions saved by not exploiting remaining fossil fuel reserves for the purposes of climate commitments as well as their financial value for the purposes of ensuring equity in the FF-NPT.

Potential allies include the climate vulnerable groupings in the climate change negotiations such as the Least Developed Countries (LDCs) and the Small Island Developing States (SIDS). Especially given the initial emphasis on obligations for OECD+ countries, such a proposal may garner widespread support. Indeed, the idea behind the proposal already enjoys cross-party support in a number of OECD countries such as the UK where Labour, Liberal Democrat and Green party spokespeople have supported the idea, including former Energy and Climate Minister Ed Davey.[2] A letter of support for the Treaty was signed and published by civil society leaders such as Bill McKibben, Naomi Klein, the heads of Greenpeace and Friends of the Earth and the climate group 10:10 (McKibben et al., 2018). Among sub-national states, cities and municipalities there are growing calls to declare a 'climate emergency', especially in light of the IPCC SR15 report. Populations covered by governments

that have declared a 'climate emergency' now exceed 31 million citizens (RTA, 2019). Bans on fossil fuel development in their jurisdictions would make a powerful contribution to the movement towards non-proliferation. Indeed, rather like nuclear-free zones before them (Firmage, 1969), fossil-free zones are being declared in some regions and could be extended to pronounce a region or municipality's intention not to approve further fossil fuel extraction or new infrastructures in the areas over which they exercise authority. There is also scope for businesses to declare support, beyond those that have signed the Lofoten declaration. For example, an open letter issued ahead of the 2015 Paris Climate Conference by a coalition convened by the World Economic Forum, comprising 43 heads of companies with operations in over 150 countries and territories together generating over $1.2 trillion in revenue, stated 'the private sector has a responsibility to actively engage in global efforts to reduce greenhouse gas (GHG) emissions, and to help lead the global transition to a low-carbon, climate-resilient economy'.

There are, nevertheless, many challenges that need to be engaged with. One is to ensure that efforts to build support for an FF-NPT do not serve as a distraction from the climate change negotiations and undermine the implementation of the Paris Agreement. We are conscious that some might fear the initiation of a new treaty could draw attention, momentum and resources away from the climate regime at the very time they are most needed. But this would be a very different type of treaty and, being complementary, its negotiation could conversely have a supportive and reinforcing effect on the climate negotiations. Indeed, it provides one way of implementing the Paris Agreement. The climate regime has to deal with a whole set of issues around adaptation, finance, technology, capacity building, and market mechanisms to name just a few. The benefit of an FF-NPT is that it goes to the heart of the problem. It would engage and involve different state personnel as, though undertaken for environmental ends, it would more likely be driven by energy and finance ministries. It provides another arm to the climate regime, reflected in Green and Dennis's (2018) analogy of using the two hands of the scissors (demand and supply) to accelerate climate mitigation.

Questions will, of course, be raised about how politically realistic such a proposal is given the current global collective reliance on fossil fuels. It is certainly the case that the power of incumbent interests should not be underestimated (Newell & Johnstone, 2018). This includes military actors that are among the largest consumers of fossil fuels in the world. The webs of power that bind governments to actors in the fossil fuel industry are dense and wide-ranging (Newell & Paterson, 1998). Concerns over capital flight and carbon leakage are real and are often mobilized by incumbent interests to resist more ambitious action. But this merely underscores the need for an international agreement that levels the playing field and lays out clearly, transparently and equitably the basis on which remaining reserves will be left in the ground to avoid companies playing governments off against one another. It is also often noted that supply-side policies should result in less international carbon leakage than demand-side policies (Lazarus, Erickson, & Tempest, 2015).

As well as noting the barriers, we also need to acknowledge the growing political momentum behind such a policy shift. We have already seen how several countries have taken bold national measures. Political tipping points to accelerate the demise of the global fossil fuel regime provide windows of opportunity to raise demands for such a treaty. Initiatives to reform fossil fuel subsidies are central to this question, as are contested but prevalent claims of peak oil, with even OPEC members making statements regarding the importance of diversifying their energy mixes. Indeed, countries such as Iran and Nigeria generate an appreciable share of electricity from renewable energy sources and almost 5.4 GW of PV capacity is set to be added by Gulf Cooperation Council (GCC) countries by the 'early 2020s', according to a study by IRENA (International Renewable Energy Agency) (Gifford, 2019). Further indicators of an emerging political tipping point away from fossil fuels might be the growing power of the divestment movement and moves from universities, pension funds and sovereign wealth funds to discontinue investments in these industries. This has been combined with greater pressure on companies to disclose their carbon assets and a wave of shareholder activism (Newell, 2008) as well as a broader de-legitimisation of fossil fuels, as cultural institutions in arts and music also seek to sever their ties to the industry. Market dynamics are also playing their part. The falling costs of solar in particular make renewables cost competitive with fossil fuels in many regions.

There are also the increasing successes of climate justice movements to leave fossil fuels in the ground including those resisting specific fossil fuel infrastructures such as the XL pipeline in the US or fracking in the

UK, as well as emergent popular campaigns such as Extinction Rebellion and the youth movement for 'School Strikes'. Likewise, the costs of business-as-usual fossil fuel use are becoming clear, not just in terms of the climate crisis, but also air quality and health; According to the World Health Organization, the simple act of breathing is killing 7 million people a year and harming billions more, with the cost of the lost lives and ill health amounting to $5 trillion a year, according to the World Bank (Carrington & Taylor, 2018).

## Conclusion

This paper has made the case for a Fossil Fuel Non-Proliferation Treaty, as part of a new wave of supply-side climate policies that deal with emissions at source. We argued that there is a significant window of opportunity opening up to start negotiations towards such a Treaty as a complement to the Paris Agreement. This is provided by the clear need to leave substantial remaining reserves of fossil fuels in the ground underscored by the latest science on climate change, the falling costs of alternatives to fossil fuels and the growing adoption of supply-side policies by states including bans and moratoria on new fossil fuel extraction.

We spelled out the three key pillars of such an agreement which parallel those of the nuclear NPT: non-proliferation (an agreement not to exploit new reserves), disarmament (the managed decline of existing fossil fuel infrastructures) and peaceful use (the financing of low carbon alternatives through a Global Transition Fund). We proposed how commitments to phase-out fossil fuels in the form of national targets and timetables could be sequenced reflecting countries current emissions, historical contributions and capacity to transition to alternative energy sources. We suggested the means are already available to undertake both a global mapping and assessment of those fossil fuel reserves which, if burned, would carry us across the 1.5°C warming line and the monitoring and verification of commitments to leave them in the ground. A global inventory of supply-side actions that countries commit themselves to could be established while negotiations proceed in order to build up momentum. These would be actions which Parties would also list as part of their NDC commitments under the Paris Agreement to raise the level of ambition. We then explored where the basis of political support for such a Treaty may lie: in countries vulnerable to the effects of climate change, as well as among those countries already taking supply-side actions that want to multilateralise such efforts to avoid free-riding by others, and a whole host of businesses, cities, civil society organizations and others that have committed to divesting from fossil fuels and resisting new fossil fuel investments.

The challenges such a Treaty would have to overcome are not to be under-estimated. But nor are they insurmountable. National efforts are crucial and have set the ball rolling. But a new global Fossil Fuel Non-Proliferation Treaty could provide a transparent and fair means to stop climate breakdown. As E. F. Schumacher said, 'Perhaps we cannot raise the winds. But each of us can put up the sail, so that when the wind comes we can catch it' (1974, p. 30).

## Notes

1. https://unfccc.int/climate-action/introduction-climate-action.
2. https://www.rapidtransition.org/events/launch-event-rapid-transition-alliance/ Accessed February 21st 2019.

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